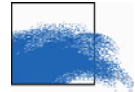


ROYAL BELGIAN INSTITUTE OF NATURAL SCIENCES

OPERATIONAL DIRECTORATE NATURAL ENVIRONMENT

MANAGEMENT UNIT OF THE NORTH SEA

MATHEMATICAL MODELS (MUMM)



## **ACTIVITY REPORT 2012**

### **OF THE BELGIAN NORTH SEA AERIAL SURVEY PROGRAMME**

**Report MUMM – W. Van Roy, M. Van Cappellen, J.P. Vogt and R. Schallier**



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## *(0.) Introduction*

MUMM's observation aircraft has flown a bit more than 278 hours in 2012, this despite different periods of unavailability during the first semester due to renovations of the aircraft, more specific the renewal of the remote sensing instruments and the avionics in the cockpit. These renovation works started in the summer of 2011 and were finished in the spring of 2012. The continuity of the program has been secured by the activation of a spare observation aircraft (Partenavia P68) in accordance with the terms of the maintenance agreement. With this spare aircraft an additional 22 flight hours were flown, of which 14 were flown 'on task' above the sea. As a result, a total of ca. 301 flight hours have been performed in 2012 (see **Table 1**).

In 2012, 205 flight hours were dedicated to aerial surveillance flights over the sea, of which 176 were above Belgian and adjacent waters (see **Fig.1**), mainly in the framework of the Belgian Coastguard structure. 108 flight hours were specifically spent on pollution control flights in the Belgian surveillance area in the North Sea. Furthermore, 40 flight hours were performed in the framework of fishery control operations in cooperation with the Flemish authorities, 2 flight hours were dedicated to the surveillance of activities at sea that fall under an environmental permit regime, ca. 6h were flown for specific national Coastguard operations and exercises, ca. 8h for so-called 'on call' assignments in the light of incidents that took place at sea, and ca.12h for the monitoring of marine mammals at sea. At the international level ca. 30h were dedicated to international missions in the framework of the Bonn Agreement. Finally ca. 4 hours were spent on the monitoring of seals in the Westerscheldt estuary, ca. 14 hours on flight training for pilots, ca. 9h for test flights, and ca. 69h for transit between the airport and the North Sea ('off task' time).

The different observation and surveillance tasks of the aircraft can be subdivided in the following categories (each of which is being further addressed below):

1. Routine pollution control flights;
2. 'On call' flights organised during an incident or following an alarm;
3. Fishery control flights;
4. Specific national missions in the framework of the Belgian Coastguard;
5. Follow-up of activities at sea that require an environmental permit;
6. International missions, operations and exercises in the framework of the Bonn Agreement;
7. Marine-scientific observations and monitoring of the sea or in the Scheldt estuary.

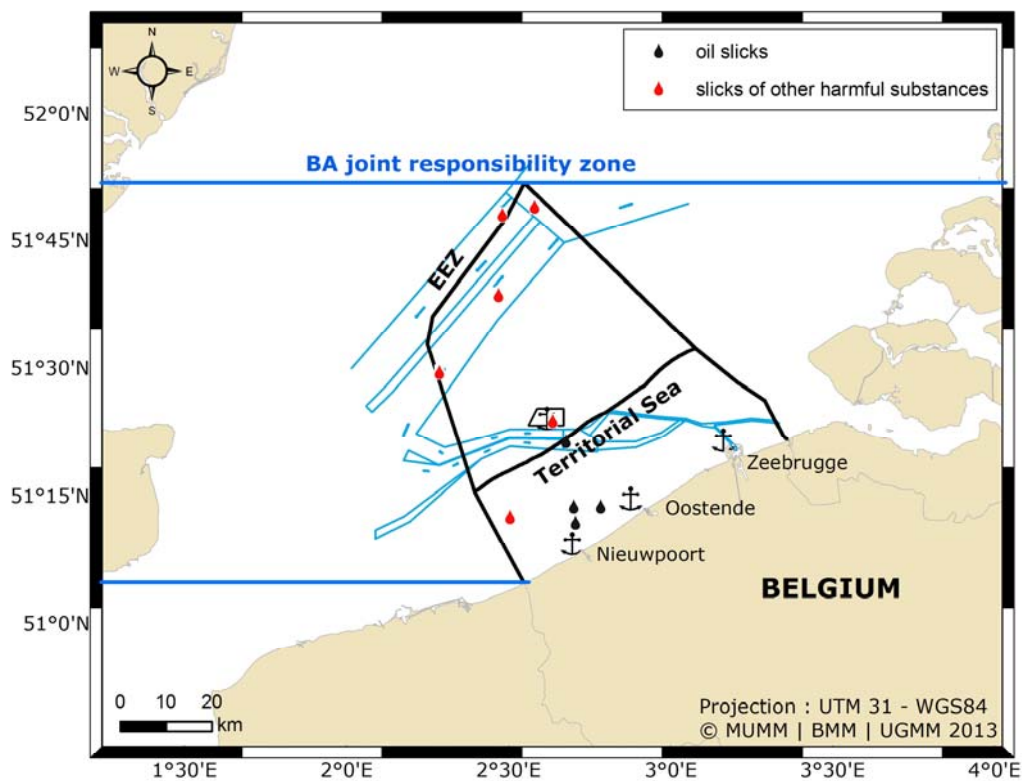
**Table 1: Overview of the flight hours performed in 2012**

| <b>Description flight hours 2012</b>   | <b>Flight hours</b> |
|--|---------------------|
| <i><u>National surveillance flights above the Belgian marine areas</u></i>   |                     |
| Routine pollution control flights in and nearby Belgian waters   | 108:20              |
| On call flights and Search and Rescue (SAR) flights  | 7:40                |
| Fishery control flights in cooperation with the Flemish government   | 39:45               |
| Pollution response exercise (POLEX) in Belgian waters  | 0:15                |
| Coastguard exercise 'OPERA'  | 5:30                |
| Surveillance on activities that fall under an environmental permit regime (windmills, aquaculture, sand extraction, ...) | 2:00                |
| <i><u>Scientific observations above sea</u></i>  |                     |
| Marine mammal monitoring   | 12:35               |
| <b>Total flight hours in Belgian waters</b>  | <b>176:05</b>       |
| <i><u>International flights in the framework of the Bonn Agreement</u></i>   |                     |
| Tour de Horizon (TDH)  | 18:55               |
| Coordinated extended pollution control operations (SUPER CEPCO)  | 10:20               |
| <b>Total flight hours in Belgian and international waters</b>  | <b>205:20</b>       |
| <i><u>Other flights - Not above the sea</u></i>  |                     |
| Scientific observations - Seals monitoring in the Westerscheldt  | 3:50                |
| Test flights, pilot training and transit   | 92:20               |
| <b>Total amount of flight hours</b>  | <b>301:30</b>       |

## 1. Routine pollution control flights

### 1.1. Results control flights

In 2012, MUMM dedicated ca. 108h to its main mission, which is to perform regular pollution control flights in search of illegal operational discharges from ships in the Belgian surveillance area at sea, being the joint “quadripartite” zone of responsibility as defined in the Bonn Agreement (further referred to as ‘BA joint responsibility zone’), which corresponds to the Belgian marine areas and surrounding British, French and Dutch waters (**Fig.1**).



**Figure 1:** Belgian surveillance area in the North Sea, consisting of the Belgian territorial sea and exclusive economic zone, and the BA joint responsibility zone, with indication of the locations of the various slicks observed in 2012 (note: 1 oil pollution was observed a little further SW in the Channel in front of the southern British coast and falls outside the scope of this figure).

In total, 11 discharges have been detected in this surveillance area, of which 5 operational oil slicks and 6 slicks of other harmful substances. These discharges of other harmful substances were:

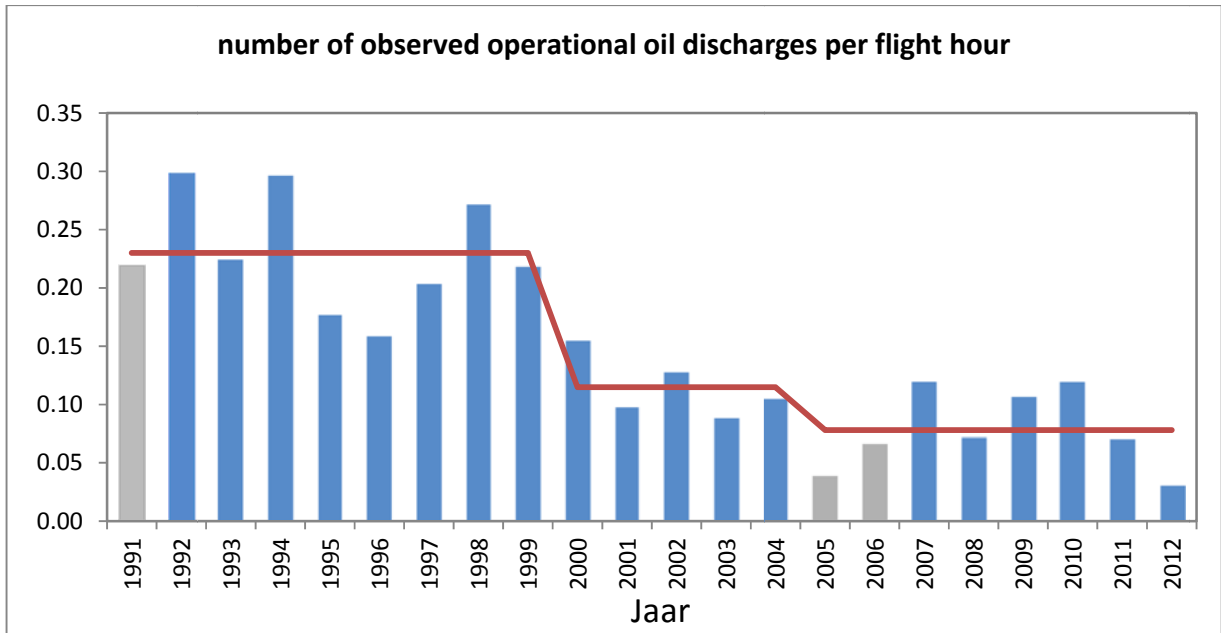
- 1 chemical discharge (presumably illegal);
- 2 unidentified slicks of an unknown source, but probably consisting of chemicals or vegetable oil;
- 3 legal discharges (among which 1 vegetable oil slick and 2 chemical slicks) in accordance with the discharge provisions laid down in Annex II of the MARPOL 73/78 Convention.

The link between a presumably illegal pollution and its polluter was established on 2 occasions. The first case involved an oil slick discharged by a Belgian vessel in Belgian waters. MUMM submitted an official statement to the competent Prosecutor's office. The second was a presumably illegal chemical slick discharged by a Maltese tanker in Belgian waters. After the observation a port state control inspection was requested in the next port of call of the tanker in the Netherlands. As a result of the port state investigation an official statement was drafted and submitted to the competent prosecutor's office.

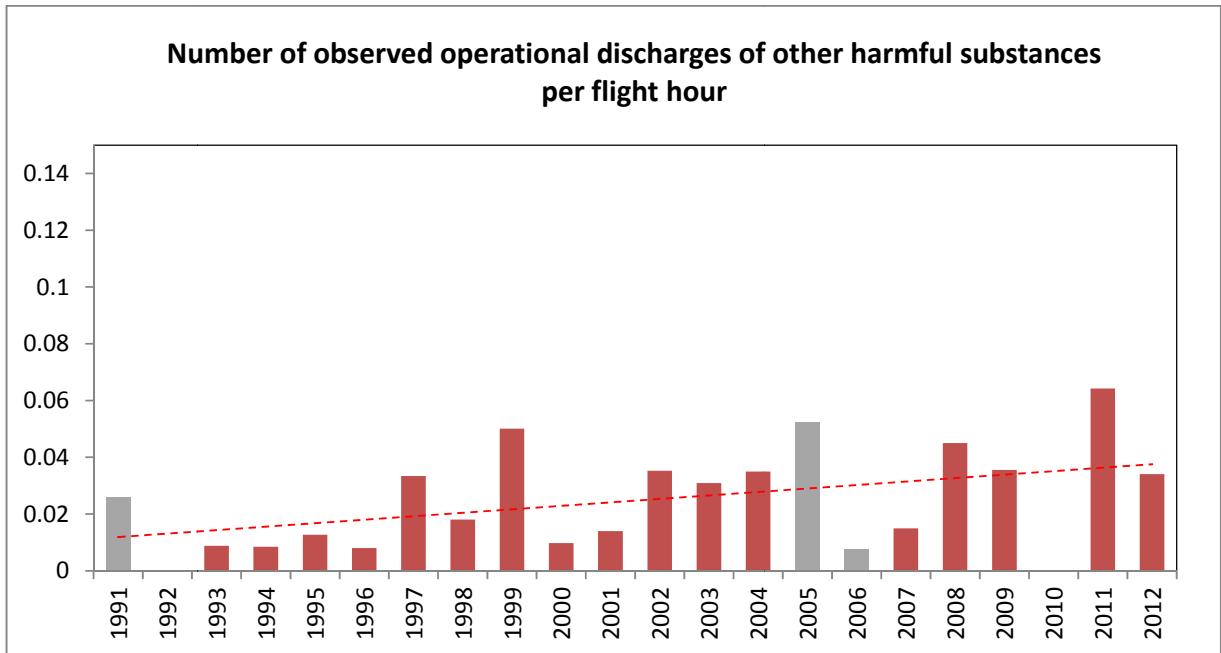
Furthermore, during transit, take-off and landing procedures, 3 oil slicks were observed in the port of Antwerp. This information was immediately transmitted to the Maritime Police for further follow-up.

This low rate of observed oil slicks and polluters caught red-handed confirms the downward trend that has been described earlier for the years 2000 (see **Fig.2**). However this environmental problem remains relevant and further follow-up is required. But what is also reflected in the results of 2012, is that for the first time in a normal surveillance year the amount of slicks of other harmful substances (so called 'chemical' slicks) is greater than the amount of oil slicks. **Figure 3** shows the amount of slicks of other harmful substances (shown as number of slicks per flight hour) since the start of the aerial surveillance programme in 1991. **Figure 4** shows the observed chemical slicks together with the yearly number of oil slicks.

On the one hand, these figures show that over the years chemical discharges contribute to a significant lower number of slicks than the oil discharges, and that the general problem of operational discharges from ships in front of our coast is no longer of the same order of magnitude now than it was before the turn of the century. On the other hand, the figures also show that the number of slicks of other harmful substances clearly do not follow the decreasing trend of oil slicks over the entire surveillance period. On the contrary the figures seem to indicate a slight increase in the amount of chemical spills over the years, although this seemingly upward trend cannot (yet) be statistically demonstrated. Moreover, as chemical discharges from ships are often allowed further offshore in accordance with the applicable international discharge provisions (cf. MARPOL Annex II), the average extent of these discharges is in general far greater than for oil discharges: For the period 2008-2012, the average length of slicks of other harmful substances amounts to 11,5 km, as compared to 'only' 5,1 km for oil slicks – more than twice as long.

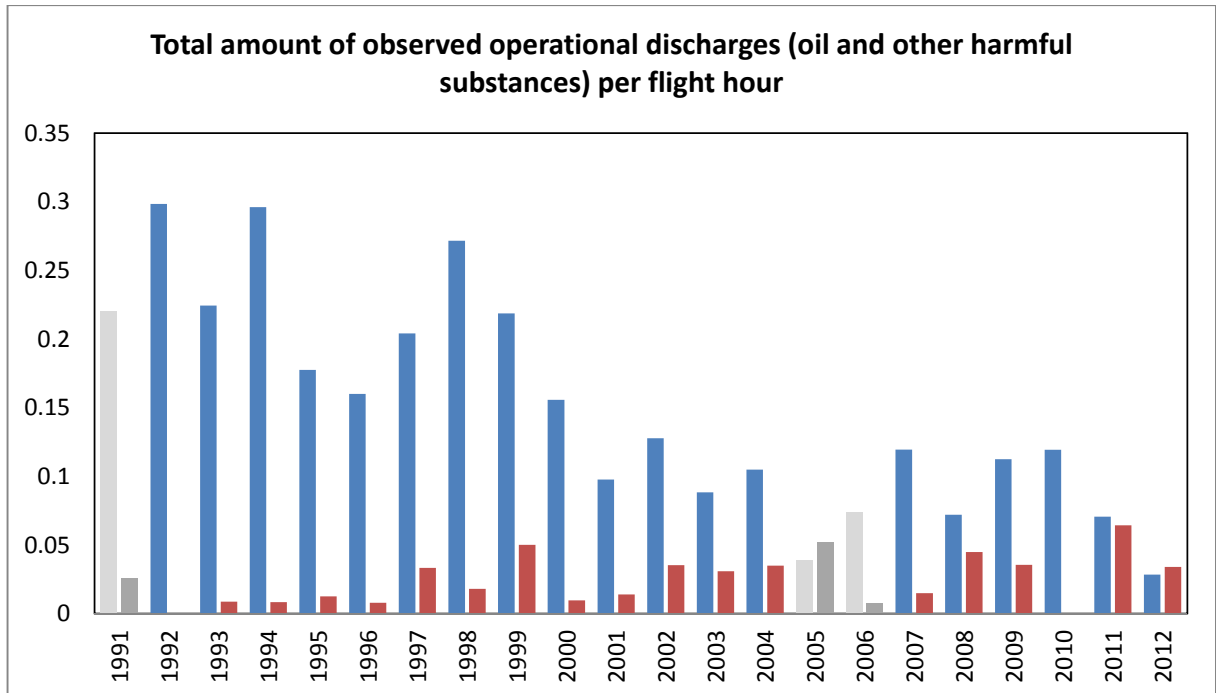


**Figure 2:** Frequency of operational oil slicks detected per flight hour (Belgian North Sea Aerial Survey programme)<sup>1</sup>.



**Figure 3:** Frequency of operational slicks of other harmful substances (so-called chemical slicks) per flight hour (Belgian North Sea Aerial Survey programme)<sup>1</sup>.

<sup>1</sup> 1991, 2005, and 2006 are transition years (1991: program start-up phase; 2005-06 transfer and conversion of the remote sensing aircraft).



**Figure 4: Frequency of operational slicks (oil (in blue) and other harmful substances (in red)) per flight hour (Belgian North Sea Aerial Survey programme).<sup>1</sup>**

On the initiative of the Minister of the North Sea, the issue of chemical discharges has in the meantime been discussed at national level in the framework of the Belgian Coastguard structure. Following these discussions, the authorities have decided amongst others to fine-tune the procedures for detection and evaluation of chemical discharges as well as the various aspects of follow-up of infringements – which were until now mainly adapted to the ‘classic’ cases of oil discharges by vessels.

The light increase of observations of chemical discharges at sea has not only been reported by the Belgian authorities. In the framework of the Bonn Agreement, also the French, Dutch and British authorities have recently confirmed the presence of this problem in their waters. The optimization of the approach to deal with such spills will therefore also be further discussed with other North Sea countries, as well as the manner in which this issue can be best brought to the attention of the International Maritime Organization.

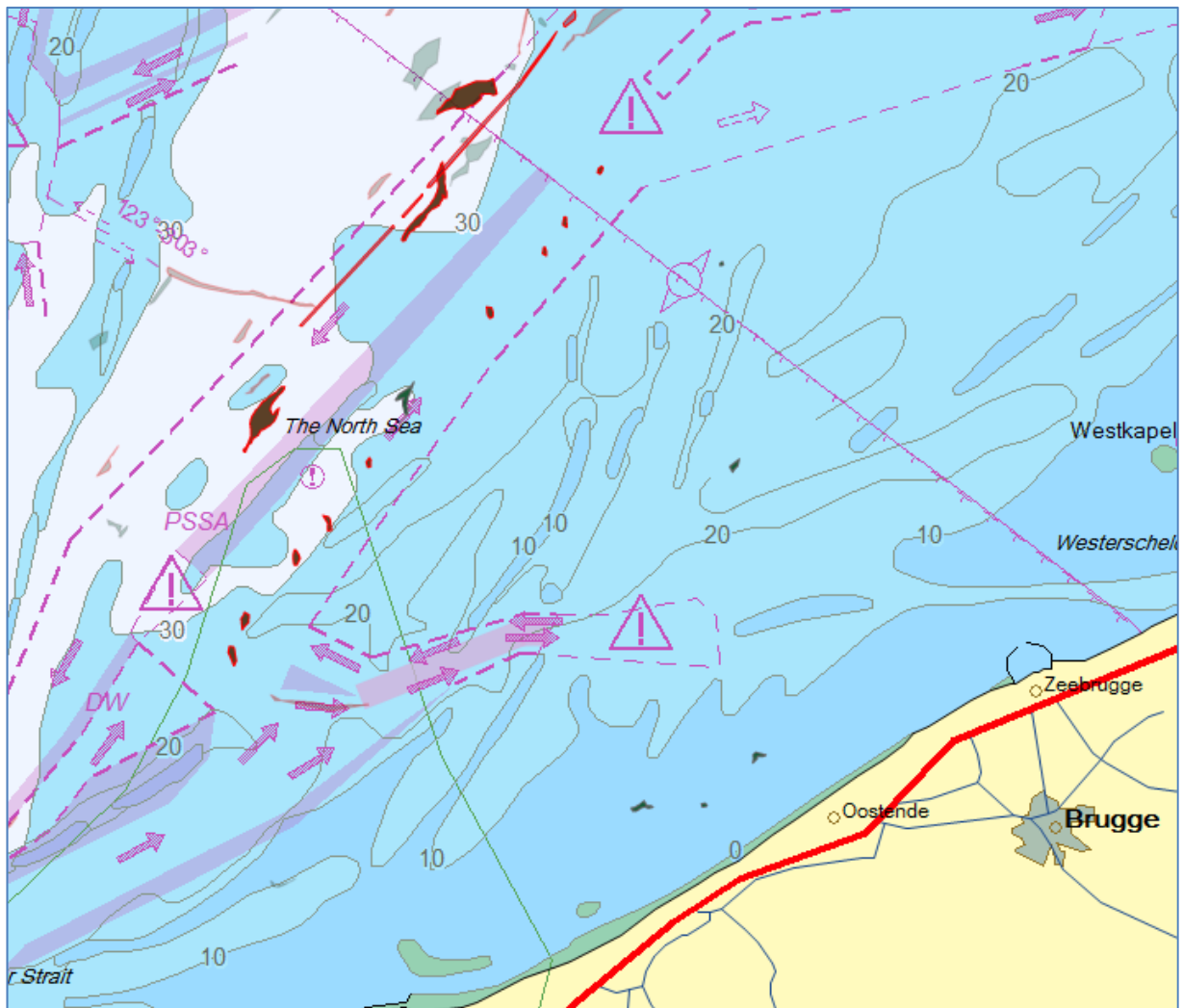
## **1.2. European satellite alert system ‘CleanSeaNet’**

EMSA (European Maritime Safety Agency) provides satellite images containing possible detections of pollution at sea to the different EU coastal States. This is done via ‘CleanSeaNet’, the near-real time European satellite based oil spill monitoring and ship detection service started by EMSA in 2007. The satellite images are first analyzed by a service provider (CLS for the North Sea) and when a potential oil slick is detected an alert report is sent to the concerning member State(s). All these data are collected and visualized by means of a GIS viewer on the CleanSeaNet website hosted by EMSA.



In 2012 EMSA scheduled 148 satellite images covering the BA joint responsibility zone, of which 120 became available on the GIS viewer. In 2012, 37 alert reports were received through CleanSeaNet concerning effective detections of potential oil spills in the BA joint responsibility zone, of which 8 detections were situated entirely or partially in the Belgian marine areas. These 8 satellite detections of potential spills in Belgian waters are presented in **Figure 5**.

For these detections in Belgian waters, 1 slick could be verified with the aircraft as being a mineral oil spill. For a second case, the presumed polluter could be identified by means of AIS, which immediately resulted in a port state control request issued via the Belgian Coastguard. The port state control inspection revealed that a discharge had indeed taken place but that it was (again) a legal MARPOL Annex II discharge of another harmful substance than oil.



**Figure 5:** Overview of the satellite detections in 2012.

## 2. 'On call' flights

In 2012, 5 special 'on call' flights were carried out (= specially organised flights as a result of a specific call or emergency situation), for a total of ca. 8 flight hours.

On the 8th of February a first 'on call' flight was organised on the occasion of a stranded sperm whale on the beach of Knokke-Heist (see [Fig. 6](#)). The aircraft was rerouted to observe and document the event (note: in case of such strandings, MUMM is responsible for the coordination of the scientific research on and autopsy of the animal).



[Figure 6](#): Stranded sperm whale (*Physeter macrocephalus*) on the beach of Heist (8/02/2012).

The second 'on call' flight was on the 6th of May and concerned a SAR operation after the sinking of a recreational fishing vessel. In this case a fishery control flight was interrupted, following a request from the MRCC, to aid the rescue services in second line with the search of the sole occupant.

The third and fourth 'on call' flights were in the beginning of September 2012 during the passage of the 'MSC Flaminia' through the Belgian waters. In the summer of 2012 this container vessel got severely damaged after a fire had broken out on board on July 14<sup>th</sup> in the middle of the Atlantic Ocean during its trip from Charleston (USA) to Antwerp. After evacuation of the crew, the ship was towed by salvors in the direction of Europe. After a thorough inspection and negotiations between the various concerned European coastal States, and also following the decision by Germany (as flag State) to allow the ship to enter Wilhelmshaven (GE), the 'MSC Flaminia' obtained authorisation from the various coastal States (among which Belgium) for a passage through the Channel and the North Sea. During the passage of the 'MSC Flaminia' through Belgian waters on the night of 5 to 6 September (see [Fig. 7](#)) the aircraft performed 2 flights to ensure an aerial monitoring of the convoy. No leakage of harmful substances from the heavily battered ship was observed.

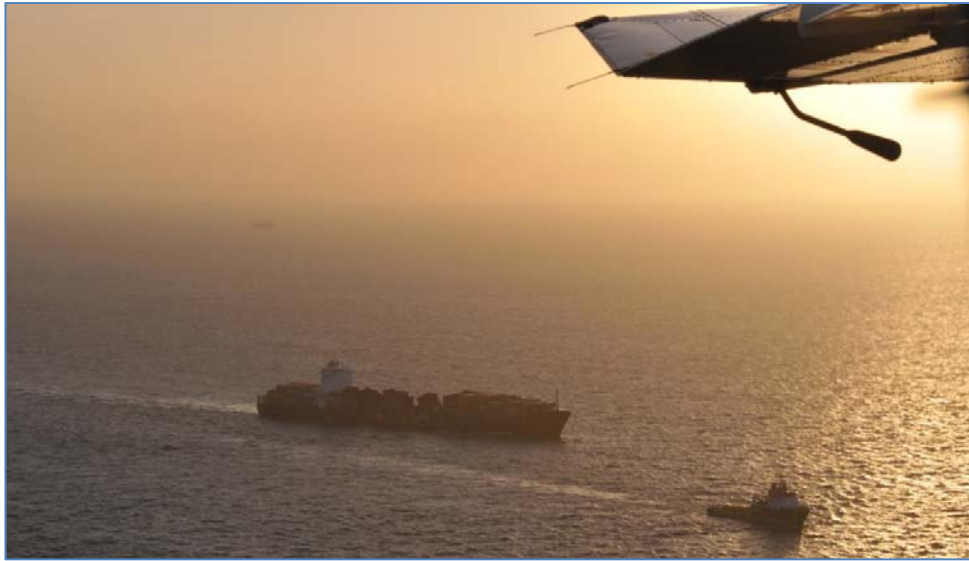


Figure 7: photo taken during the passage of the MSC Flaminia through the Belgian marine areas (5/09/2012).

The last 'on call' flight was organized after the collision between the 'Baltic Ace' and the 'Corvus J' in nearby Dutch waters. On the 5th of December the auto carrier 'Baltic Ace' sank almost immediately after the collision with the 'Corvus J'. In the early morning of December 6<sup>th</sup>, the surveillance aircraft briefly offered assistance in second line to the Dutch and Belgian authorities involved in the large-scale search and rescue operation for the still missing crew members. At the same time the MUMM operators checked for oil leakage from the sunken ship and found none. Until now the wreck of the Baltic Ace has still not been removed and there is still an increased level of alertness in and nearby the zone of the wreck.



Figure 8: Corvus J with severely damaged hull after collision with the Baltic Ace (6/12/2012).

### *3. Fishery control flights*

Fishery control flights have already been executed over a period of 20 years on behalf of and in cooperation with the Fishery Inspection Service (DZV) of the Flemish Government. In this framework of aerial surveillance on fishery activities in the North Sea, especially with respect to the access limitations in force for fishery vessels in shallow coastal waters (3 nautical miles limit) and the territorial sea (12 nautical miles limit), a total of 39h45 flight hours were performed in 2012. These control flights were performed during the day (26 flights) as well as during the night (18 flights). 19 of these flights involved missions of international control, as part of "JDP's" (Joint Deployment Plans), joint control operations coordinated by the European Fisheries Control Agency (EFCA). During one of these international flights the aircraft flew outside its normal intervention zone whereby the fishery inspectors also controlled fishing vessels in fishing grounds of neighbouring countries (France, the UK and the Netherlands in our case). Finally 2 fishery control flights were carried out as part of the nationally coordinated Coastguard operation 'OPERA' (see § 5.1.).

In 2012, 501 fishing vessels were observed and identified during these fishery control flights (see **Fig.9**). The fishery inspectors observed one infringement: In June, a fishing vessel with a gross tonnage of more than 70 GT was observed inside the (for this type of vessel forbidden) 3 nautical miles zone. The other observations provide interesting information that can be used for at-sea control by patrol vessels or for the verification of the vessels' positions mentioned in their logbooks or derived from the VMS satellite system, and contribute as such to the creation of a more complete image of the fishery activities in our sector.



**Figure 9:** Photo of fishing vessel defying heavy weather in front of our coast.

## ***4. Specific national missions in the framework of the Belgian coastguard***

### **4.1. Participation in the OPERA operation**

Operations under the name 'OPERA' are organized by the Belgian Maritime Security Centre (MIK), and allow the coordination of all available seagoing units within the Belgian Coast Guard structure, as part of an intensive enforcement operation in the Belgian marine areas.

As in previous years, the available units of the Maritime Police, the Navy, the Customs, the Fishery Inspection service (DZV), the Environment Directorate and MUMM were jointly activated during one week in 2012, with the aim to coordinate their enforcement actions at sea and to identify all offenders who do not respect the regulations in force at sea.

The MUMM surveillance aircraft has contributed to this campaign with 5 specific OPERA control flights, for a total flying time of 5h30. During two of these flights a fishery inspector was also on board besides the MUMM operator.

All observations made during these reconnaissance flights over the Belgian waters were systematically reported to the MIK, who ensured the coordination between the flying and sailing units.





## ***5. Surveillance of activities at sea that fall under an environmental permit***

### **5.1. Follow-up of the activities of the installation and exploitation of wind farms**

In the framework of the follow-up of the construction and exploitation phases of wind farms, the aircraft regularly surveys the area, amongst others to report on progress to the authorities and to verify the compliance with the environmental permit conditions. In 2012 during routine control flights in the Belgian zone 11 observations were made concerning activities in the windmill parks. The findings were systematically reported to the Coastguard.

### **5.2. Follow-up of the aquaculture activities and of experimental fishery zones**

As all the aquaculture activities came to an end in 2011, the effort used to control these activities in 2012 remained restricted to one control flight, requested by the Coastguard, to verify that all floating structures were removed from the sea surface.

### **5.3. Follow-up of sand and gravel extraction activities**

Finally, the aircraft is also used to exercise control on the sand and gravel extraction activities in the Belgian marine areas (see **Fig.10**). Every extraction vessel that received an environmental permit is equipped with an automatic registration system, a so-called 'black box', which automatically registers date, time, position, speed, status of the pumps, etc. MUMM is responsible for the technical management and control of these black box systems on behalf of FPS Economic Affairs. By reporting sand and gravel extraction activities observed at sea, the aircraft delivers interesting extra information for the verification of the black box data. In 2012 the aircraft observed and reported 11 sand and gravel extraction activities at sea.



**Figure 10:** Observation of a sand extraction activity.

## **6. International missions in the framework of the Bonn Agreement**

Aerial surveillance in the North Sea is coordinated at the international level in the framework of the Bonn Agreement. Every country organises its own national aerial surveillance. In addition however, international operations, missions and joint exercises are also planned yearly. In 2012 MUMM performed 2 international missions: in the summer a so-called TDH mission was performed and in the autumn the aircraft took part in a 'Super CEPCO' operation. Finally, the aircraft took also part in a sub-regional POLEX exercise.



**Bonn Agreement**  
**Accord de Bonn**

### **6.1. TDH-mission for the control of offshore platforms**

As described in the annual program of the Bonn agreement, the Belgian aircraft performed a Tour d'Horizon or TDH mission for the control of offshore oil and gas platforms in the central and northern part of the North Sea. During these so called TDH missions all pollutions are systematically observed and reported to the competent authorities of the relevant coastal State, regardless of whether the source of pollution is a ship or a platform. This yearly TDH operation was performed by the Belgian aircraft from the 2<sup>nd</sup> to the 6<sup>th</sup> of July 2012, hereby flying over Dutch, Danish, British, Norwegian and German waters. During this mission with a total flying time of 18h55, 6 potential oil slicks were detected. In 5 cases the polluter was identified: 3 slicks originated from British platforms, 1 slick was linked to a fishery vessel and 1 slick was linked to a Norwegian platform.

### **6.2. Super CEPCO-operation in key risk area**

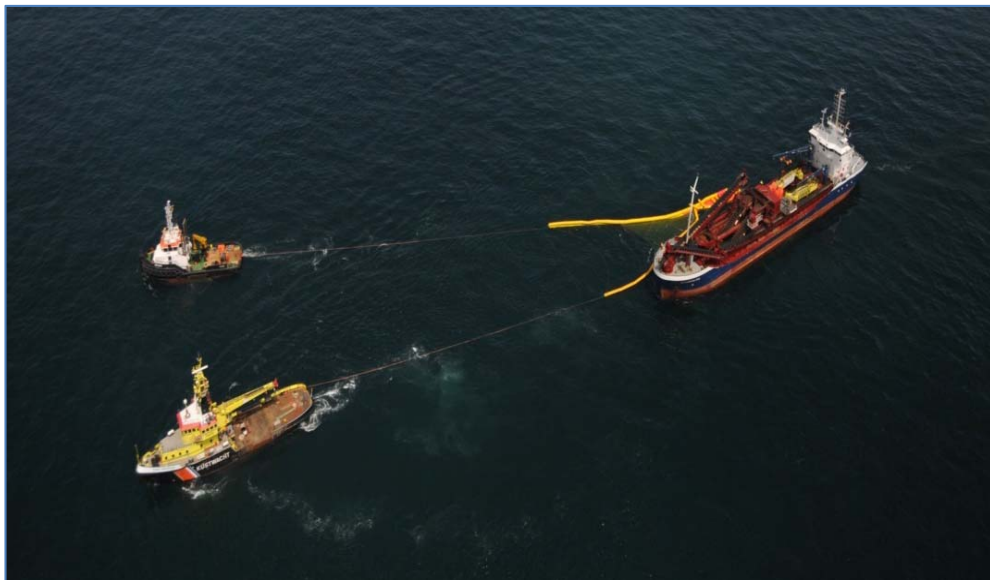
A CEPCO surveillance operation consists of a series of consecutive pollution control flights performed by several aircraft from different North Sea countries, with the aim to perform a continuous aerial surveillance in a high risk area for illegal oil spills for a period of at least 24 hours. In 2012 a major CEPCO operation, named 'Super CEPCO', was organized for the fourth time: from 10 to 12 October 2012 the Belgian aircraft flew 10h20 flight hours in the framework of this Super CEPCO 2012, as part of a multi-day aerial surveillance operation performed above the Gulf of Biscay together with French, Spanish, Norwegian, and German surveillance aircraft. In this way the Belgian aircraft made a substantial contribution to the multi-day continuous monitoring of the busy shipping area between Brittany (Brest) and Galicia (A Coruña).

### **6.3. POLEX multinational oil pollution response exercise**

On 28 June 2012 the aircraft took part in a multinational oil pollution combating exercise organised in the mouth of the Westerscheldt ('*Vlakte van de Raan*') and coordinated by the Belgian Environment Directorate in cooperation with other Belgian Coastguard partners, the Dutch *Rijkswaterstaat* and EMSA. Holding such exercises at sea is considered to be very useful for different reasons: it is ideal for training of the effective deployment of the various response means (both sailing and flying) of the different national public services, and also of other European partners - if raised to the international level as was the case in 2012. It is also

considered useful to test and if required improve the whole pollution combating organisation, including the aspects of communication between response units.

During the 2012 POLEX exercise in which Belgian, Dutch and European (EMSA) response units participated, the task of the Belgian surveillance aircraft was to guide the response units. The different response vessels that participated in the exercise were the Frans Naerebout and the Arca (NL), the Zeehond and the Zeetijger (BE), the Interballast III and the DC Vlaanderen 3000 (EMSA). Moreover, different other vessels were used to support the pollution combating exercise such as: Albatros, GEO surveyor, Provider,... Besides the aircraft from MUMM, also a helicopter from NHV was activated by the Environment Directorate to deliver additional aerial support.



[Figure 11](#): Simulation of a pollution response configuration during the POLEX exercise (28/06/2012).



## **7. Scientific observations**

### **7.1. Monitoring of marine mammals at sea**

Aerial monitoring of marine mammals through "distance sampling" is an excellent method to determine their number and density in a predetermined sea area. The most common marine mammal in the Belgian marine waters, the harbour porpoise, after decades of absence since the late 1990s, reappears again in the southern North Sea. The marine mammal monitoring carried out at sea in 2012 was held as part of the study of the effects of construction and operations in offshore wind farms. In 2012 a total of 12h35 flight hours was dedicated to this monitoring. During these monitoring flights a total of 187 harbour porpoises and 8 white beaked dolphins were observed and also 1 seal of which the species could not be identified. These observations are used to estimate the spatio-temporal distribution of harbour porpoises in Belgian waters.

### **7.2. Monitoring of seals in the Scheldt estuary**

During every transit flight from the airbase (located in Antwerp) to the sea, the aircraft flies over the Westerscheldt estuary. Owing to the regular passage of our aircraft over this area, it is an excellent observation platform of opportunity: The high number of transit flights has the advantage that the inter-annual variability of the seals can be monitored. Therefore, MUMM recently started performing regular counts of seals in the Westerscheldt (see previous activity reports). In 2012, a total of 13 transit flights were used, for a total flying time of 3h50, for systematic counts of the common seal and grey seal in the Westerscheldt. In total 953 animals were observed.



**Figure 12:** Seals resting on a sandbank in the Westerscheldt estuary.

### **7.3. Remarkable observations of natural phenomena**

Whenever a remarkable natural phenomenon is observed during routine surveillance flights, MUMM will report it and a description will be given. In 2012 only two remarkable observations were made of the Sea Sparkle (*Noctiluca sp.*; microscopic dinoflagellate) and three observations of large amounts of macro-algae.

## *Colophon*

This report was issued by MUMM in September 2013.

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☐ confidential

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☒ French

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